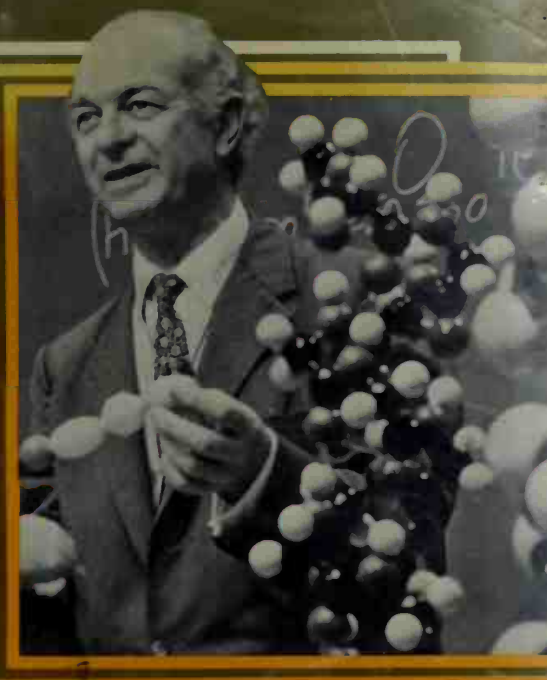

Linus Pauling

Scientist and Crusader

ence Meiman White

Florence Meiman White has written the exciting story of a man who has devoted his life to science and peace.

Dr. Linus Pauling worked on the nature of the chemical bond that holds atoms together, and for this work was awarded the Nobel Prize for chemistry. He also won the Nobel Peace Prize for helping to stop the spread of nuclear weapons.

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"Science and peace are related," Dr. Pauling says. He believes that scientific knowledge can be used for the benefit of humanity.

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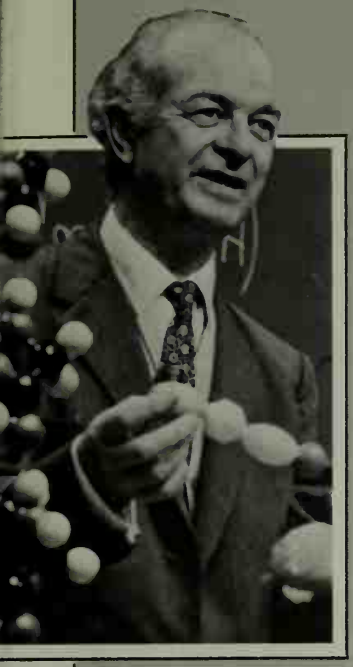

Linus Pauling

Scientist and Crusader

by Florence Meiman White

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To Linus Pauling's grandchildren and great-grandchild Linus Fowler Pauling, Peter Chadwick Pauling, Christopher Pauling, Sabrina Pauling, Ramona Pauling Berent, Thomas Pauling, Sarah Pauling, Barclay James Kamb, Alexander (Sasha) Kamb, Anthony Pauling Kamb, Linus Peter Kamb, Cheryl Pauling, Kirstin Pauling, Crellin Pauling, Jr., David Crellin Pauling, and great-grandson Leo Berent

To Florence White's grandchildren Andrew White and Stephen White

And to all the children, grandchildren, and great-grandchildren in the world, may you know

NO MORE WAR

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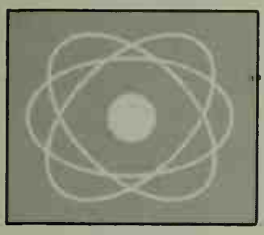


Contents

1 An Inquisitive Child

IT WAS six A.M. Thursday, October 10, 1963, in the quiet town of Pasadena, California.

The telephone ringing beside her bed woke Linda Pauling Kamb. She blinked the sleep from her eyes. Who could that be so early in the morning? No one she knew was up that early, except her father. Suddenly she remembered. Her parents were at their cabin on the Big Sur coast, in the mountains of northern California. Her father liked to climb over those rough hills alone. Fear gripped her as she reached for the receiver.

"Hello? Is this Mrs. Kamb?" a man's voice asked.

"Yes. Who is this?" She tried to keep the fear from her voice. It was a call from New York, a reporter for the *New York Times*. "We have a message for Dr. Linus Pauling. We can't reach him

at his home. Will you kindly let him know . . .'' The message was short. Linda's fear turned to happy excitement.

''Thank you. Thank you so much. That's wonderful. I'll call my father immediately.''

She lay back on her pillow for a moment, dazed.

No. She couldn't call her parents so early in the morning. They would be as frightened as she had been. Besides, they didn't have a telephone in their cabin. She would have to call the forest ranger at Big Sur.

During the next hour the telephone rang almost constantly—newspaper reporters wanting to speak with Dr. Linus Pauling.

Promptly at seven Linda telephoned the forest ranger. ''Will you be good enough to deliver a message to my parents? Please ask them to call me when they can.''

The Paulings were having breakfast in their one-room cabin overlooking the Pacific Ocean when the forest ranger arrived about seven thirty. ''Your daughter called,'' he announced. ''Said there was a message for Dr. Pauling. For you to call her.''

Why would Linda call so early? Linus and Ava Helen were perplexed. They quickly finished breakfast, got into their car, and followed the ranger to the Forest Service House. Linus called Pasadena.

''Linda, what's happened?'' he asked anxiously.

Linda laughed, relieved at being able to speak with him.

''Nothing, Dad. I mean—something—some-

Linus Pauling, two years old

thing wonderful. A call came for you. You've been awarded the Nobel Prize for Peace!''

Dr. Pauling was silent, stunned by the unexpected news. The Nobel Prize! The highest honor in the world! Awarded to those men and women who had contributed the greatest service to mankind during the previous year. And he had just received it—for the second time in his life!

How did it happen?

Linus Pauling was born in Portland, Oregon, on February 28, 1901, to Herman and Belle Pauling. Herman Pauling was a druggist who earned a living by working as a salesman for a wholesale drug firm, and the little family lived in a one-room tenement flat near the Chinese section of the city.

Within the next few years, two little daughters

Linus Pauling,
four years old

were born to the Paulings, Pauline and Lucille, blond children with clear blue eyes like their brother's. The family had moved to the town of Oswego, where Herman Pauling's parents lived, and rented a small, comfortable house. Herman Pauling had been raised here and had become a druggist by working in a local drugstore.

There was great unemployment in Oswego, so the only doctor left town. People came to Herman for free medical advice as well as for their medicines. On his way home at night he stopped to visit his sick customers. They liked this friendly, concerned druggist, but they had no money to pay him, and Herman Pauling was unable to earn enough to support his family.

The Paulings moved again, this time to Condon, in eastern Oregon, where Belle Pauling's family lived. Linus's father set up a drugstore, hoping that things would be better here.

Five-year-old Linus was enrolled in the one-room schoolhouse near his home. On warm, sunny afternoons he roamed through the unpaved streets and alleys with his cousin Mervyn Stephenson, three years older than he. When the days were cold and bleak, he liked to visit his father's drugstore. He sat on a high stool in the back room, and while amusing himself by pulling the teeth out of an Indian skull, he watched his father mixing powders and potions to make medicines. Then he would ride with his father in the horse-drawn wagon to deliver the medicines to the ailing customers.

When summer came, Linus spent many wonderful days on the wheat ranch owned by Mervyn's father. He and Mervyn carried jugs of water to the workers sweating in the fields. In return, they taught the boys to shoot their hunting rifles. Linus learned to hold a rifle and aim at a passing bird or animal. But when the moment came to pull the trigger, he shut his eyes and turned his face away. He just could not shoot an animal.

Linus was nine when the Paulings moved again, back to the big city of Portland, where they had started. Herman had not reaped the fortune he had hoped for in Condon. For the second time, he started his own drugstore. He worked long hours and neglected his health.

Linus, without Mervyn to do things with, turned more frequently to reading. After he had read the

few books in his home, he borrowed books from all his friends and neighbors. At nine he was reading adult literature. One evening at the supper table he asked his father, "What shall I read now?"

Herman Pauling was not a scholarly man, but he recognized that his young son had an unusual mind. Public libraries were new and few at that time. Not knowing where else to turn, he wrote to the editor of the *Portland Oregonian*, a local newspaper:

"My son has read all the books in sight and is demanding more. Would you please suggest some appropriate titles that would be best for him?"

The letter was published in the newspaper, but the concerned father never received an answer to his question.

In June 1910, before Herman could pursue his search for books for Linus, he died at the early age of thirty-three of a stomach ailment. Nine-year-old Linus was sad and bewildered. To whom could he turn for help? His mother was always busy with household chores and raising her family. With her husband's death her work and responsibilities increased. She now had to earn a living to support her three young children, so she bought a rooming house. In this way she could earn money and care for the children at the same time. She already knew she was very ill and might not live to see her children grow up.

But Linus had to earn his own spending money. He found an after-school job setting up bowling pins in a bowling alley. The girls were too young to be of much help. They did small chores around the

house. When they grew older, they took jobs tending babies and running errands for neighbors.

Linus's appetite for reading and learning never slackened. He was curious about everything. He began to collect insects and minerals. There weren't many collectible minerals in the Willamette Valley, where he lived, but there were plenty of insects. "Just imagine! There are more than one million species of insects in the world," he informed his amazed sisters. "I read it in a book." The following Saturday afternoon when he returned from a trip to the nearby woods, they watched him separate ladybugs from dragonflies and caterpillars and place them carefully into jars.

Linus had built a workroom in the basement of the boardinghouse, with shelves for his collections. Here he could be alone—to think, to read, to work—without interruption from his sisters or the roomers or his mother, who asked him to do more chores than he cared to do. He placed a lock on the door to secure his privacy.

Charles and Adelheit Pauling, Linus's paternal grandparents, still lived in Oswego. Every Sunday Linus with his mother and sisters took the steam train to visit them. He amused Grandmother Adelheit by reciting the German nursery rhymes she had taught him when he was two years old. He recalled the German he had learned at that time, and they talked together in her native language.

Linus had never known his maternal grandmother. She had died when her own children were very young, and Linus's mother barely remembered her. But she spoke often of her father, Linus

Wilson Darling. This grandfather had died a few months before Linus had lost his own father. Belle had been raised by her father and she adored him.

"Your grandfather was a remarkable man, Linus," she always began, "and very smart. He was only eleven years old when the family broke up and he was left with nobody to care for him. He became a 'bound' boy. He was bound out to a family to work for his food and a place to sleep," she explained. "But your grandfather didn't remain bound for long, not *your* grandfather," she added proudly. "When his master made him sleep in a barrel, he ran away and eventually became his own master.

"Grandfather Linus did not get very much schooling, but he learned things wherever he went. He learned to read and write, and most important of all, he learned to think things out. He became a teacher in a country schoolhouse. Your grandfather was very smart, Linus, very smart." She paused, thoughtful, still impressed by this wonderful father of hers. "And then he became a land surveyor and then a postmaster. He could do most anything he set his mind to. By working in a lawyer's office he even became a justice of the peace and a lawyer. Everyone in the town called him judge."

Linus's mother told other stories of her father, stories of courage and bravery that young Linus liked to hear.

A retired mountain guide by the name of Yokum lived around the corner from the rooming house. He, too, told stories of danger and ad-

venture, and Linus liked to stop there on his way home from school. The elderly man was impressed with the boy's interest in learning. "You must learn Greek, my boy," he urged. "A real scholar must know Greek." He set about teaching twelve-year-old Linus this difficult language.

By the time Linus Pauling was thirteen, he knew some Greek, could count to one hundred in Chinese, and was able to speak German fairly well. His wide readings had included two books that his father had used in his work—the 692-page *Pharmacopoeia of the United States* and the 1,947-page companion book *The Dispensatory of the United States of America*. The *Pharmacopoeia* gave detailed descriptions of the drugs used in the early part of the twentieth century. The huge *Dispensatory*, described as a "handbook for druggists and doctors," recommended medicines for over six hundred illnesses, for everything from acne and boils to snakebite and warts. Linus gradually developed a strong interest in science.

In February 1913 he entered high school, eager to learn more about everything.

2 No Graduation from High School

WASHINGTON High School in Portland had many courses to offer its students. Linus studied English, Latin, literature, ancient history, mathematics, and science. He was interested in everything. But his greatest love was science.

During his first year he took a course in general science with a teacher who inspired her students. She had a large collection of minerals—flint, quartz, limestone, and many other rocks and stones that he had never seen. He was fascinated and listened carefully as she described the formation of minerals in the earth, their characteristics, and their uses.

Linus became close friends with a boy who shared his interest in science. Lloyd Jeffress and Linus took long walks in the woods and had long talks in the basement workroom of the board-

inghouse about rocks and trees, electricity and machinery. Sometimes they talked about what they wanted to be when they grew up. Physicist? Chemist? Geologist? They loved the important-sounding words.

After one such serious conversation Linus decided to set up a laboratory in his workroom. On the way home from school the next day he stopped in to see Mr. Yokum, who worked part-time in a chemistry laboratory. He told his friend of his plans. "But I have no equipment," he said in a troubled voice. Laboratory equipment was expensive. "Don't worry, my boy. I'll see what I can do," Mr. Yokum promised. A few days later he brought back pieces of chemical apparatus that were no longer needed in the laboratory but that were of great help to Linus.

In his junior year Linus studied chemistry with Mr. Greene. This perceptive teacher quickly recognized his student's ability and offered Linus the opportunity to perform experiments under his direction after school hours.

One afternoon Linus performed a particularly difficult experiment. Wearing a rubber apron, he assembled tubes and bottles; carefully weighed, measured, and mixed; took notes; then cleaned up and put everything back in order.

When Linus was finished, the teacher placed his hand on the shoulder of his tall student. "If you ever want to become a chemist, Linus, you will be a fine one, a very fine one," he said.

Lloyd Jeffress often came to Linus's laboratory at home, and the boys worked together on ex-

periments. Sometimes they filled the house with horrible odors. One day they frightened the neighborhood.

It happened on a quiet Sunday afternoon. The two boys hid behind the rosebushes in front of Linus's house and waited silently for the trolley to approach. A few minutes later, as the trolley passed the gray rooming house, there was a loud explosion. In the silence that followed, the boys could hear windows and doors opening on the street as frightened people looked out to see what had happened. The culprits turned toward each other, smiled, and shook hands.

"We did it! Boy, we did it!" Linus exclaimed.

"Yep. It worked," Lloyd echoed. "I bet they could hear it all over Oregon!"

Linus and Lloyd had placed on the track a vial containing an explosive chemical, harmless but noisy.

Many afternoons Linus went to Lloyd's house, where he lived with an aunt and uncle. Linus greatly enjoyed the times Lloyd's aunt invited him to stay for dinner. As the family sat around the table, they talked of books and music, of new ideas in politics and in science. This was the kind of home he wanted to live in. These were the kind of people he wanted to spend his time with. In his mother's rooming house the men who came and went talked about their girl friends or their jobs in stores and factories. These men rarely had the opportunity to read.

After dinner Linus played chess with Lloyd or Lloyd's uncle. He had learned to play by reading

the *Encyclopedia Britannica*, then making chessmen by drawing the figures on squares of paper.

In addition to school, friends, and hobbies, Linus always had a part-time job—delivering milk for a milk company in the early morning or working the motion picture projector in a movie house at night.

During his first three years at Washington High School, Linus had taken many courses. He was sure that by the end of his last year he would have more than enough to graduate and enter Oregon State College. But he had not taken American History 1 and 2, which were required for graduation. He had planned to take them both during his last semester since he heartily disliked such courses.

On registration day Linus signed up for the two required history courses. "I'm sorry, Linus," the advisor told him. "You cannot take both courses during the same semester."

Linus looked surprised.

"Didn't you know that?" the advisor asked.

"I . . . I . . . didn't," he answered, confused.

The kindly lady could hear the disappointment in his voice. She knew that Linus was an excellent student and suggested that he speak to the principal.

Linus went immediately to the principal's office. The principal knew of his fine record. Perhaps he would give him permission to take the courses simultaneously. Linus explained his problem.

"The rule in Washington High School is that American History 1 and 2 must be taken in two consecutive terms. They cannot be taken simul-

taneously," the principal answered in a cold, matter-of-fact tone. "I can make no exceptions."

Linus would not be permitted to graduate in June without these two required courses. Although he was deeply disappointed, at this time in his life it did not occur to him to question the principal's decision. Without a word, he rose from the chair and left the office. The next day he registered for two math courses—college algebra and trigonometry—in place of the history courses.

In June 1917, after three and a half years in high school, Linus left without a diploma. He found a full-time job as an apprentice machinist for a machine company at a salary of forty dollars a month. At the end of the first week he was raised to forty-five dollars and at the end of the first month to fifty dollars. Linus was earning a man's wages, but his plans to enter college and to become a chemical engineer had not changed.

Linus's mother was disturbed by her son's determination to leave his job. The rooming house had never earned a comfortable living for her family.

"Linus, I need your help. I still have Pauline and Lucille to support. No one on the street has gone to college. Why must you?" she pleaded.

"I want to learn, Mama. There's lots to learn in college," he answered in a low, steady voice.

"You can learn to be a chemical engineer while you're working," she urged. "Your father became a druggist by working in a drugstore. Your grandfather became a lawyer by working in a lawyer's office." Belle Pauling did not understand her son's need for education.

Linus often spoke of his problems to Lloyd's aunt and uncle. They were in complete sympathy with him. "You have an unusual mind, Linus," they said. "It's important that you get an education worthy of your ability, an education that will introduce you to new ideas and new subjects." Linus was grateful for those evenings at their home. They helped him maintain his courage and determination to continue studying.

In an effort to earn more money, sixteen-year-old Linus went into business after working hours. He, a friend, and another young man who was a photographer installed developing, printing, and enlarging equipment in the friend's basement. They hoped to get the photography work from the drugstores in Portland. Linus figured that if he could get the business going before leaving for college, it would earn five or ten dollars a week for his expenses.

An old friend of Linus's father helped the three young men get the photography work from a few drugstores. But it was not enough. Before the summer was over, the three were out of business.

Meanwhile, trouble was coming from another direction. Things had gone wrong with Linus's application for admission to Oregon State College. The secretary at Washington High School had made errors in filling out his admission papers. Linus had taken forty hours of Latin. She had given him credit for only twenty. She had failed to record another course he had taken. The principal was on vacation, and nothing could be done until he returned.

Linus waited anxiously. To pass the time, he memorized Latin poems and their English translations. He worried about his appearance, the wrinkles on his forehead, and what kind of impression he would make in college. There were moments when he was afraid he would never get into college.

One evening during the middle of September 1917, Linus returned home from the machine shop and found a letter waiting for him. He had been accepted at Oregon State!

Before he left Portland, Linus went to see his old friends and teachers in Washington High. They were glad to see him and wished him good luck. He visited his grandparents in Oswego. His Grandmother Adelheit cried and made him promise to write to her every week. The machine company owed him a month's salary. When he went to get it, Mr. Schweizerhoff, the owner, spoke to him. "You can get a job here anytime you want to, Linus. You will be a success in anything you undertake."

3 A Great Decision

IT WAS a breezy Saturday afternoon in October 1917. Linus Pauling, age sixteen, and his mother stepped off the electric train at the railroad station in Corvallis, Oregon, eighty miles from Portland. As this was Linus's first time away from home, Mrs. Pauling had insisted upon accompanying her son to be sure he was safely settled in his new quarters. She would not see him again until Christmas.

Arriving students and teachers were milling about, greeting old friends and classmates. Linus looked around for his cousin Mervyn. A few minutes later he heard Mervyn's voice and turned to see him pushing through the crowd. The two cousins embraced each other warmly. Then Mrs. Pauling, Linus, and Mervyn went to the boardinghouse where the boys were to share a room with

another student. Linus's mother examined the large room, after which she spoke to the landlady. Satisfied that her son would be comfortable, she left.

Linus's share of the rent was twenty-five dollars a month, including meals. The two hundred dollars that he had saved from his earnings in the machine shop lasted five months. When it was gone, he found a job in the girls' dormitory, chopping wood for the cookstoves, cutting up quarters of beef for cooking, and mopping the kitchen floor. He worked twenty-five hours a week at twenty-five cents an hour. With so little money, he could not afford to eat at the boardinghouse. Now he ate one hot meal a day in a cheap restaurant and bought a ten-cent doughnut for breakfast. Many times he went hungry.

His first semester was a disappointment. He found his courses no harder than those he had taken in high school. "I'm not learning very much," he complained to Mervyn. He needed new ideas and new problems to challenge his imagination. After that first semester he looked for the most difficult courses offered. He studied chemistry and physics. He took every course in mathematics, from advanced algebra and trigonometry to calculus. He studied metallurgy too and took English literature and gymnastics, the latter to build up his chest muscles. He was excellent in every subject. With his ability to work quickly, he had time for other activities.

Linus was interested in oratory and was selected official orator for his junior class. He became a

member of the track team. This was the result of an angry argument with a track star. As the five-foot-ten-inch-tall sprinter lunged at him, Linus, six feet tall and long-legged, began to run and left the star far behind. The news spread, and Linus was put on the team.

Linus joined a fraternity and a short time later outwitted his fraternity brothers in one of their pranks. One Saturday night every member had to prove himself popular by having a date, otherwise he would be dunked in the bathtub. As Linus didn't have a girl whom he cared to date, he had to take the punishment. But he prepared himself well. He breathed deeply to oxygenate his blood, then, conserving the oxygen by not struggling, he was able to lie quietly in the tub for a full minute and a half, a long time to be under water. The boys who were holding him down, seeing him lying still and motionless, became frightened and released him. They were amazed when he emerged calm and smiling.

In spite of work, study, and extracurricular activities, Linus did well in all of his subjects except one. He received an F in gym. He had not been able to attend classes because of his job.

During the summer months Linus worked as a paving inspector for the state of Oregon and earned $125 a month. The state was building highways through the mountains. It was Linus's duty to inspect the blacktop pavement being laid, take samples of the materials used, and analyze them in a laboratory of the chemical engineer, under whose direction he worked. He worked well, and his co-

workers, men much older than he, developed respect for his judgment. Linus enjoyed the work, but he enjoyed even more the freedom he had to read scientific reference books and to study the properties of chemical substances.

That summer Linus sent his entire salary to his mother to bank for him. She spent it because she needed it, and she did not think it necessary for him to go to college. She was already near death from pernicious anemia, for which there was no cure at that time. Linus would have to work until he had saved enough to return to school.

But it was only a temporary setback for him. Early in November 1919 he was offered a position as an assistant instructor at Oregon State. World War I had ended, and many young men were returning from the battlefield and entering college. More teachers were needed. Linus Pauling, age eighteen, was asked to teach a chemistry course to sophomores, a course that he himself had finished just a few months before. His salary would be one hundred dollars a month. Linus didn't mind the smaller income. It would be wonderful to be back on the campus in a world of learning.

His schedule was a crowded one. He spent forty hours a week teaching in the classroom and the chemistry laboratory. In addition, he had to prepare lessons, grade papers, and keep records. His office was a small corner of the chemistry library. The books there received little use. When his work was done, Linus browsed through them.

Late one afternoon as he was about to leave, he was attracted to a book he had not noticed before.

He pulled it from the shelf and opened it. It contained an essay written in 1916 by Dr. Gilbert N. Lewis, one of the outstanding physical chemists in the world.

Dr. Lewis had a theory about atoms, the tiny units that make up all substances, and how they are joined together to form molecules. Linus was excited. Here were bold, new ideas that he had never heard mentioned in any of his chemistry classes or read about in any of his textbooks. Dr. Lewis's theory has since been changed and added to by other scientists, as many scientific theories have. But for Linus it was the beginning of a new world.

Everything in the world—animal, vegetable, or mineral; your fork or your finger, your buttons or your body—is made of molecules. Molecules are sometimes called "the building blocks of the world." They are tiny, tinier than the dot at the end of this sentence. But they are made up of still tinier things—atoms. Just as bricks are made up of small particles of clay lumped together, so molecules are made up of atoms joined together.

Dr. Lewis's theory explained how links, or connections, are formed between atoms, tiny links, but so strong that they can hold atoms together, forming molecules that last for thousands of years, like those in the Pyramids in Egypt or the bones of huge dinosaurs that perished millions of years ago. He called this link the "chemical bond."

Linus was fascinated. If he could learn more about the chemical bond and the manner in which atoms are joined together, then he could un-

derstand what keeps things from falling apart, in fact, what keeps the world together!

He thought about Dr. Lewis and his ideas until late that night. By the next morning Linus had made a great decision, the greatest decision of his life. His life's work would be in chemistry, particularly that part dealing with chemical bonds and the structure of molecules.

Since Linus's grades for the first two years had been excellent, he was now permitted to study at his own pace and to take as many courses as he wished. Very few students were granted this privilege. He now took a great many chemistry and math courses.

One day during a class in organic chemistry, he made up a dye called malachite green. What a great color, he thought, and promptly removed his khaki shirt—he was in ROTC—dipped it into the dye solution, and went home looking like a sparkling Christmas tree.

He took a course in metallography, the study of chemical elements called metals and their mixtures called alloys. Linus liked Samuel Graf, the young professor who taught the course, and Graf was attracted to Linus by his inquiring mind. Later in the year Professor Graf asked Linus to be his teaching assistant in the course. The work required knowledge of both mathematics and physics, both of which Linus had studied.

Now Linus graded papers, kept records, and helped Professor Graf in many ways.

That year Linus was selected by the college to be its candidate for a Rhodes Scholarship, a prize

highly esteemed and desired by college students all over the country. The scholarship granted four years' study at Oxford University in England.

With the application, a candidate had to submit references from his professors. Linus's references were excellent. One of them amazed him. Floyd Rowland, professor of chemical engineering, wrote: "Mr. Pauling possesses one of the best minds I have ever observed in a person of his age, and in many ways he is superior to his instructors."

Linus was competing against other fine young people throughout the nation. To his great disappointment, he was not among the winners.

But the following year he had two wonderful experiences. He was elected to the honorary engineering society. Though he was already a member of several other honorary societies, this distinction made him proud.

The second experience had a lasting influence upon his life. Linus was requested to teach a class in chemistry to home economics majors who had already completed one semester in the subject. He had decided to start with a quiz to find out how much his students knew. As he entered the classroom that first day, he found twenty-five young women waiting for him. They looked critically at this young, lanky teacher with his hair parted in the middle and plastered to his head. He quickly opened the gradebook he had prepared and ran his finger down the list of names, looking for a student to call on. "Amelia Barsook, Allegra Magriel, Ava Helen Miller." He stopped. This last name he could pronounce easily.

Linus Pauling, twenty-one years old

"Miss Miller," he called, and looked up to see a pretty brunette with curly hair and blue eyes rise from her seat.

"Will you please tell us what you know about ammonium hydroxide?" the young teacher asked.

Miss Miller knew a lot about ammonium hydroxide, and Linus breathed easily. The strain of the first few minutes had passed.

When the hour was over, the class left. But the memory of Ava Helen Miller remained with him all through the day and into the night. How could he get to know her? The college did not approve of friendships between students and teachers. One afternoon he found the courage to invite her to walk across the campus with him. She accepted the invitation.

For the next few weeks Linus Pauling and Ava

Helen Miller walked and talked. He learned that she was one of twelve children raised by a widowed mother just as he was. They talked about poetry and art and literature, even about politics. It seemed to Linus that Ava Helen was interested in almost everything. In addition, she could play the piano and was the best student in his chemistry class!

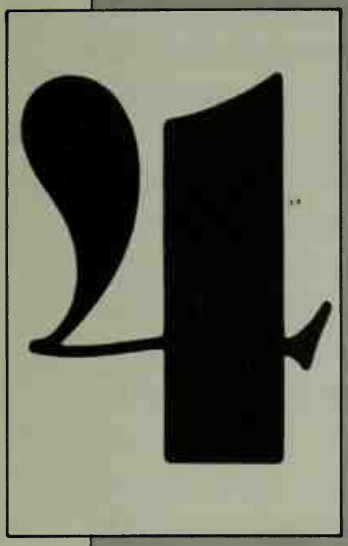
Ava Helen liked this young man who knew so much. His bright blue eyes sparkled when he talked about science. By the end of the month the young pair were engaged.

Graduation was coming closer, but Belle Pauling still urged her son to come home and find a regular job. "You can teach chemistry in high school or work for the government or in industry. These are fine jobs, Linus," she tried to persuade him. But Linus's ambitions lay in a different direction. He had supported himself completely since he had entered college. His mother could not stop him from going on to graduate school.

Linus applied to the University of California in Berkeley, where Dr. Gilbert N. Lewis was head of the Department of Chemistry. It was the work of this brilliant scientist that had inspired Linus to devote his life to chemistry. He also applied to Harvard University, near Boston, and to the California Institute of Technology, in southern California. The University in Berkeley was slow in answering and Linus was disappointed. Harvard was old and famous, but encumbered with many rules and regulations that he felt would hamper his studies. The California Institute of Technology was

young. He believed that here he would have more freedom to work. Most important of all, one of the finest chemists in the United States, Professor Arthur A. Noyes, was head of the Chemistry Department and was interested in the nature of the chemical bond.

Cal Tech offered Linus a teaching fellowship. This provided an opportunity to teach and earn money to support himself while doing graduate work. Linus would teach one course each semester. It seemed like a perfect situation.



Chemistry and Marriage

LINUS PAULING, age twenty-one, entered the California Institute of Technology in October 1922. The questions that were uppermost in his mind were those concerning the nature of the bond between atoms and the structure of molecules. Dr. Lewis's theory held that the chemical bond resulted from the joining of two or more atoms. Linus wanted to know how atoms are joined, how far apart they are when they are joined or bonded together, and many other things about atoms.

He found Cal Tech a fine place to work. At that time there were seven graduate students in the Department of Chemistry and nine faculty members—an excellent staff carefully selected by Dr. Noyes. This gave students and professors an opportunity to know each other well. They met often, both in and out of the classroom, and had spirited

discussions. The subject of atoms, molecules, and the chemical bond was being investigated at Cal Tech as well as at other universities around the world. It was an exciting time.

Linus was working for a Ph.D.—a Doctor of Philosophy degree. In order to receive this, a student must do new research in his field of study. He generally works under the guidance of a faculty member. Dr. Noyes assigned him to Dr. Roscoe Dickinson, a competent chemist ten years older than Linus.

Linus had become interested in the structure of crystals. Now he set to work in a two-man laboratory on the second floor of the Gates Chemical Laboratory.

In two months he worked on about a dozen different crystals, made X-ray photographs of them, and studied them, but without success. When Dr. Dickinson came to his aid and showed him how to interpret the X-ray photographs, he was able to determine the positions of the atoms in the crystals. He was also able to find the distances between the atoms and the angles between the bonds that hold the atoms together. These factors determine the structure of molecules. A molecule of water has a different structure from a molecule of sugar or a molecule of oxygen, and each contains a different number of atoms.

This study of the atoms and molecules of crystals later led Linus Pauling to the study of the atoms and molecules in the human body.

During his first year at the institute, Linus took almost all the important chemistry courses besides

courses in mathematics and physics. There were no rules to limit his studies. In addition, he taught a freshman class in chemistry.

The highlight of each week was a seminar guided by Professor Richard C. Tolman, a well-known chemist and physicist. Dr. Tolman believed that physics could be used to help solve problems in chemistry. Linus was impressed with the idea that one science could be used to study another.

Professor Tolman asked his students searching questions. One day he asked Linus to discuss a subject with which Linus was unfamiliar.

"I don't know. I haven't studied that yet," Linus answered.

When the session was over, an older man who had just finished his Ph.D. work and who had known Linus in Portland, took him aside.

"You shouldn't have said that, Linus," he advised.

"Why not?"

"Because now that you're a graduate student, you're supposed to know everything."

"Everything?" Linus Pauling thought about this for a moment.

"I'll try," he said seriously. "I'll try."

To know everything! He did want to know everything he could about the chemical bond, about atoms and molecules, about chemistry.

Linus also studied with Dr. Robert A. Millikan, an outstanding physicist. But he did not find his lectures interesting and often did not attend.

Cal Tech was becoming a leading teaching and research center in the country. Great scientists from

around the world came to lecture. New ideas were constantly being discussed. Linus had the good fortune to meet several eminent European physicists—Niels Bohr, who in 1913 had given the world the first idea of atomic structure; Arnold Sommerfeld, who was interested in the behavior of atoms as they absorbed or gave off light; and the greatest of them all, Albert Einstein, known throughout the world for his theory of relativity, which added greatly to a better understanding of the physical laws of the universe. These men inspired Linus to do research in many directions and he came to know them well.

Late at night, when classes were over, Linus wrote letters to Ava Helen, now a sophomore at Oregon State College. Since he did not have enough money to go home for holidays or to make long-distance telephone calls, letters were their only means of communication during those many months of separation. Now they made plans to marry. They set the date for June 17, 1923, when the school year would be over.

Linus had managed to save twenty-five dollars to buy an old Ford. On the day classes were over, he drove north to Oregon. Linus and Ava Helen were married in a simple ceremony in the home of one of Ava's sisters. He was twenty-two, she was nineteen.

That summer Linus again worked as a paving inspector. When the summer was over, he and Ava drove south to Pasadena. Linus went back to classes and laboratory, and Ava Helen started housekeeping in a small apartment near the campus.

Ava Helen and Linus Pauling, 1924

Linus continued to research, experiment, and write during the next two years. He published many papers about his work on crystals. When it was time for him to submit a report on the research work done for his Ph.D. degree, he had little to do except put his papers in proper order.

In June 1925 Linus Pauling graduated and received the Ph.D. degree *summa cum laude*. In Latin this means "with the greatest honor." Ava Helen was proud of her brilliant husband. In addition, both were very happy about another event in their lives. Just three months before, Ava Helen had given birth to their first child, Linus junior. Now there was a lively baby to add joy to the Pauling home. For a few days Linus admired and played with his wonderful new son. But soon he was back to his usual heavy schedule of work.

Less than a year later Linus was awarded a Guggenheim Fellowship to travel and study in Europe. Of course Ava Helen would go with him. Linus took it for granted that Linus Junior would go, too.

But Ava Helen had other plans. Her mother had offered to take care of the child so that the young parents would be free to enjoy the year abroad.

Linus looked doubtful. "Don't worry," Ava Helen said, laughing. "My mother raised twelve children. I think she can manage another."

"You can't drag this infant halfway around the world," Mrs. Miller protested. "He'll be just fine here. I'll keep you informed of everything that's happening," she promised.

In the spring of 1926 Linus and his wife packed their bags, took a train to New York, and boarded a ship for Europe.

It was exciting to be in the scientific circles of Europe at that time. Young scientists like Linus, and older ones too, were discussing new ideas about the world of atoms and molecules. It was the beginning of modern chemistry and a new way of looking at chemical problems.

One of the important new ideas being discussed was quantum mechanics. This was a mathematical theory dealing with the movement of electrons in atoms and molecules. Linus had studied quantum mechanics at Cal Tech. He was eager to learn more. It would be important for a better understanding of the structure of molecules.

Before leaving Pasadena, Linus had made arrangements to study with several of the leading

scientists in Europe, among them Professor Sommerfeld, a physicist who was an authority on the subject of quantum mechanics. Now Linus attended his lectures two hours each week, gaining valuable knowledge that he would later put to good use.

Linus's year abroad was extended by six months. After a year and a half he was eager to return to his laboratory. Also, he and Ava Helen were anxious to see their young son. They wondered if he would recognize them after such a long absence. There was now a third reason, a most important one. Dr. Linus Pauling had received a letter from the California Institute of Technology offering him a position as an assistant professor of chemistry!

5 "Boy" Professor

THE PAULINGS returned to the United States in the fall of 1927. Many changes had occurred during their absence. The year-old baby they had left behind was now a little boy of two and a half. Although Grandma Miller had told him that Mama and Papa were coming home, he was shy in the presence of two adults whom he could not remember.

Linus's mother had died of pernicious anemia. She had taken great pride in her son's Guggenheim Fellowship but had never had the pleasure of seeing him established in a "regular job."

The second unit of the Gates Chemistry Laboratory was being constructed at the institute. There would be more space for more investigations into the problems of chemistry. Linus could hardly

Linus Pauling—
young professor

wait for its completion. In addition, a beautiful building had been put up called the Atheneum, with Oriental rugs on the floors and oil paintings on the walls. Here Dr. and Mrs. Pauling enjoyed dining with other faculty members and their wives, and it was here that the institute entertained visiting scientists and celebrated the great occasions when their own members were honored for their scientific contributions.

Linus, at twenty-six, was the youngest member of the faculty. But he looked younger than his age, and students often referred to him as "the boy professor." To make himself look older, he grew a luxurious red beard.

He still taught a freshman class because he enjoyed teaching young students eager to learn. He and his assistant spent hours making models of

molecules. They cut geometric forms from paper and pasted them on wire frames. With brightly colored pieces of plastic, they made balls to represent atoms and put them together with short plastic tubes into different configurations to represent different molecules. These became famous as his "ball and stick models." They looked like big, colorful Tinkertoys.

Dr. Pauling usually came into a lecture room smiling, unhurried, dressed in baggy pants and a sports shirt decorated with Hawaiian dancing girls. He perched himself on a corner of the laboratory table and began, "As I came here, I was thinking of how Professor . . . and I differ." He presented his own ideas, then those of the other scientist. As he lectured, he used his attractive models, which clearly showed the relative sizes, placements and separations of various atoms that, when bonded together, formed the fascinating and baffling molecules.

Students were inspired by Dr. Pauling. Occasionally, if they complained of being overworked, he did an assignment on the chalkboard in fifteen minutes to show them how easy it was. His greatest reward in the classroom came when a student asked a question that went beyond the material he had presented.

A student once asked him how to get good ideas. "You must have lots of ideas," he answered. "Just throw away the bad ones."

In 1931, Pauling wrote a long paper about all that he had learned since he was a graduate student in 1922. He called it "The Nature of the Chemical

Bond." It contained all that he knew about the size and structure of molecules as determined by their chemical bonds. He contended that the properties and function of all the molecules in the world are determined by their chemical bonds.

This knowledge was fundamental to the work that Dr. Pauling and other scientists later did in the fields of biology and medicine.

6 Blood

DURING the early morning of February 10, 1931, a second child was born into the Pauling family, a son, Peter, and a year later a lovely daughter, Linda. The Pauling home was filled with the laughter and sometimes the tears of three happy, playful children. Linus rarely gave himself enough time to enjoy them. After a long day of work, his mind was still occupied with problems until late into the night. Each morning he came to work with a new idea. His colleagues said that Linus always wanted tomorrow's answers today.

A short time after the birth of his second child, thirty-year-old Linus received a prize from the American Chemical Society as the most promising young research chemist in the United States. One newspaper called him "the rising star who may yet win the Nobel Prize." Linus smiled as he read this.

It was nice to think about, perhaps even to hope for. The award was presented at the national convention of the society in Buffalo, New York.

One day soon after he received this award, Linus Pauling looked intently into the microscope at a piece of asbestos—a mineral that does not burn or conduct heat and is often used to fireproof buildings. He took the specimen from under the microscope and held it in his hand for a moment, then began to pull it apart. It was made of fibers as thin as a strand of hair. He turned to his assistant. "If we can understand the fibers of asbestos, why not the fibers in the human body? Hair, muscles, even fingernails. They're all made of fibers."

Soon Pauling began to study the atoms and molecules of human hair. It was his first move away from the study of crystals and minerals and toward the study of the protein molecules in the human body.

The most important element in the body and in all living things is protein. A continual supply of protein is necessary for growth and for repair of the wear and tear that is constantly going on in the body. Protein differs from all other kinds of food substances in that it alone contains the nitrogen that is necessary for life. That is why it has the Greek name that means "of first importance." Eggs, meat, milk, wheat, peas, and cheese are some of the foods that contain protein.

Pauling realized that to understand the human body and how it works he would have to understand the structure of the protein molecules in the body. These are large and complex, in contrast to

the small, simple molecules of crystals and minerals.

About six months after he had begun his study of hair, Linus stopped into the office of Dr. Noyes. The department chief had been away on a lecture tour.

"What are you up to now, Linus?" Noyes asked.

"Blood, Dr. Noyes! Blood!" Linus answered in the style of the detective stories that he enjoyed reading. Both men laughed. "To be more specific," Linus continued, "I'm using magnetism to study the hemoglobin molecule of the red blood cells." He went on to explain the experiments that he was conducting.

The red blood cells contain hemoglobin. This is the protein that gives the blood its color and carries oxygen from the lungs to every part of the body. Linus found that iron atoms form the center of the hemoglobin molecules and can bind with the oxygen molecules of the air. Many years later this knowledge helped to save the sight of many children.

One such incident occurred in 1961. A distraught mother with three small children rushed into the office of Dr. Franz Cleton, a doctor at the University of Washington Medical School. The children had swallowed a bottle of iron tablets that they had found in the medicine chest. Dr. Cleton knew that iron in large doses can cause blindness. He was familiar with Dr. Pauling's discovery and injected the children with a chemical that bonded tightly with the iron atoms in the tablets. A short

time later both the iron and the chemical were passed through the kidneys and out of the bodies of the three children.

This principle has since been used for many medical, industrial, and agricultural purposes.

From a study of the structure of hemoglobin Linus went to the study of immunology, the way in which the body protects itself against disease. He began to study antibodies. These are substances that the body creates to defend itself against viruses and bacteria that cause infectious diseases. It took several years for him and his associate, Daniel Campbell, to discover how antibodies are formed in the human body.

In the midst of this work, Linus suffered a sad loss. Dr. Noyes, one of his best and oldest friends, died. The Chemistry Department became a lonely place for Pauling without this wise and kindly man.

About a year later, in May 1937, Linus was appointed Noyes's successor as head of the Chemistry Department and director of the Gates and Crellin Laboratories. It was a proud day for Linus and Ava Helen Pauling and was followed almost immediately by another important event. On June 4 Edward Crellin, the fourth and last child, was born to the Paulings. He was named for the man whose generous gift had made possible the second unit of the laboratory.

With four active children, Linus and Ava Helen decided to build a large home to suit their many needs. In a wooded area, just five miles from the institute, they found two acres covered with old

Family portrait, 1937

oak trees. It was just the right place for the Pauling family. They immediately began to plan the house.

Linus wanted a house shaped like a molecule. Ava Helen wanted enough rooms for their young brood. Linus drew up the plans but had a difficult time persuading a puzzled architect that this was exactly what he and his wife wanted. After five months of construction Linus, Ava Helen, Linus junior, Peter, Linda, and the baby Edward Crellin moved into a low, rambling sunshine-filled home.

Linus's study was soon filled with books on chemistry, as well as psychology, biology, politics, economics, international affairs, science fiction, and detective stories. The children's playroom was covered with balls, bats, skates, crayons, old models of molecules, and as they grew older, dic-

tionaries and encyclopedias that their father kept bringing home.

Occasionally Linus permitted himself time off to enjoy his family. Sometimes on a Sunday morning he and his three sons and daughter would lie on the large living room floor reading and laughing over the Sunday comics. Linus enjoyed the antics of "Peanuts" and "Dennis the Menace" as much as the children did.

On some evenings, after the children were asleep, Linus stretched out on the long living room couch and relaxed as he listened to Ava Helen play his favorite Chopin waltzes on the piano.

One day Linus took Peter and Linda to his laboratory at the Institute. The children were curious about the long glass tubes, the jars of powders and liquids, and the balance where things as light as a feather could be weighed with the greatest accuracy. Most of all they were intrigued by the microscope, through which they could look at a drop of blood and see the red and white blood cells.

As they were leaving the laboratory, a hot wire from a lab heater caught Linda's thin dress. "Daddy! Daddy!" Linus heard screams behind him. He looked around. In a leap he was down on his knees beside her, beating out the flames with his bare hands.

Students and young professors often came to discuss problems with Linus and to enjoy Ava Helen's warm hospitality. In return they taught the children to pitch a ball and often rescued a kite from the branches of a tall tree.

Linus was still working on the structure of protein. It was known that proteins were made up of strings of amino acids. But no one knew the details of their arrangement in space, that is, how they are coiled. Pauling and his associate, Dr. Robert Corey, began a ten-year study of protein structure, using the tools of physics and biology to help in their work.

In 1939 the essay that Pauling had written about ten years before entitled "The Nature of the Chemical Bond," with the addition of six more essays, was published as a book by the same name. It quickly became recognized as a classic on the nature of the chemical bond and the structure of molecules. It was translated into many languages and is still being used. The book was dedicated to his good friend Dr. Gilbert Newton Lewis, whose paper on chemical bonding had started him on his life's work.

Dr. Linus Pauling had been one of the pioneers to use chemistry, physics, and biology to study the structure of protein. At forty he had become known as the outstanding theoretical chemist of the United States and probably of the world.

His chemistry department became one of the leading ones in the country. Scientists and students from all over the world came there to study or to work. His original ideas stimulated their imagination.

One day in the early 1940s, Dr. Pauling had dinner with several physicians who discussed the disorder of sickle-cell anemia. A large number of people in the United States and Africa were victims

Family portrait, 1941

of this disorder. The symptoms were continual pain, suffering, and weakness.

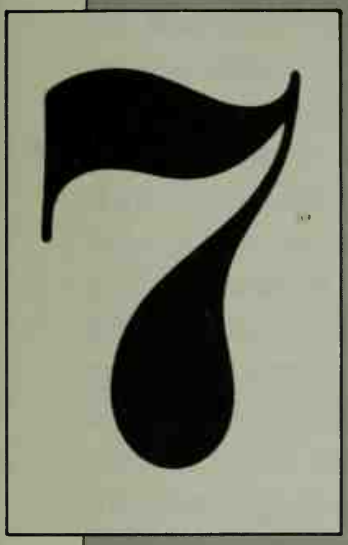
Dr. Pauling had been continuing his study and experimentation on the structure of hemoglobin molecules in the blood. Normal blood cells are disc-shaped. This makes it easy for them to pass through the blood vessels. In the blood of sufferers of sickle-cell anemia, the cells are shaped like a sickle. They are rigid; they clump together and pass through the blood vessels with great difficulty. Pauling got the idea that sickle-cell anemia might be a disorder of the hemoglobin molecule. No one had ever before suggested that a hereditary abnormality could be caused by an abnormal or defective protein molecule.

After years of study and experiment, Dr. Pauling and others confirmed the fact that sickle-

cell anemia is indeed hereditary. The victims have abnormal hemoglobin molecules, which interact with one another in such a way as to twist the red cells out of shape.

Pauling's interest in sickle-cell anemia led him to the question of what role molecules play in other disorders. He continued to work in the field of molecular biology.

But his work was slowed down by events that shook the world.



War

IN 1929 an economic depression set in all over the world, including the United States. Businesses closed, people lost their jobs, some were starving and homeless. Many wandered over the country hoping that somewhere there might be jobs for them. But there were none.

When Franklin D. Roosevelt took office in Washington in 1933, he formulated laws to provide jobs for the unemployed. After these laws were passed by Congress, the government employed people to work in forests, hospitals, schools, playgrounds, and in the theater. The money that these people earned was spent on food, clothing, and other necessities. And the economy began to improve. Roosevelt's program became known as the "New Deal."

Ava Helen Pauling had always been interested

in political affairs. Linus Pauling had but one interest—atoms and molecules. But the suffering of his fellow Americans touched him deeply, and both Paulings became New Dealers.

In Germany unemployment caused so much unrest that industrialists and landowners became frightened. They wanted a strong government to protect them and their wealth. In January 1933 Adolf Hitler, leader of the Nazi party, became ruler of Germany. He immediately began to build up Germany's army.

Hitler and the Nazis believed that Germans were a superior race and everyone else was inferior. They destroyed the labor unions and the opposition political parties. They also launched a vicious attack against the Jews of Germany. Scientists, writers, artists, and all others who were opposed to Hitler's ideas were suppressed. They had to flee the country or risk losing their lives.

On September 1, 1939, the German army invaded Poland. The attack was sudden and ferocious. They dropped bombs over cities; over schools, shops, and churches; over defenseless men, women, and children. The world was shocked. Two days later England and France declared war against Germany. World War II had begun.

On December 7, 1941, Japan attacked Pearl Harbor, and the United States declared war on both Germany and Japan.

The three leading European powers—England, France, and the Soviet Union—were allied with the United States. Italy and Japan were allied with

Germany. Norway, Sweden, Holland, and France fell to the Nazis, and the Soviet Union was invaded.

Linus junior, not yet eighteen, enlisted in the Air Corps. Ava Helen went to work in the laboratory. Dr. Pauling volunteered his services and the use of his laboratory to the United States government. He worked on rocket fuels for the navy and developed a powder that could shoot a rocket off at high speed. He learned that the government had an urgent need for an oxygen meter in submarines and airplanes. In one week he had designed, constructed, and delivered the instrument to Washington. This meter gave warning to the crews that the oxygen content in the craft was dropping to a danger level. It is still being used by doctors to measure the oxygen content of the blood during anesthesia.

Dr. Pauling was also a consultant to the government on medical research. During times of war, blood plasma—the liquid part of the blood—is necessary to replace the blood lost by wounded soldiers. This is not always available on the battlefield. Linus, with his associate Daniel Campbell, experimented in the laboratory until they were able to make a synthetic plasma.

For his services and contributions, Linus Pauling was awarded the Presidential Medal of Merit, the highest honor that the president of the United States can bestow. He also received several awards from the army and navy.

During these war years, many of Pauling's students went off to the battlefield. Some never

Linus Pauling in his laboratory at California Institute of Technology

returned. Others returned wounded. Linus was deeply troubled.

In spite of Dr. Pauling's outstanding work for his country, the Paulings roused the wrath of their community by an act of kindness. They employed as a temporary gardener a young Japanese-American soldier who was on leave from the United States Army.

Pauling was working on immunology at the time, and since his laboratory was being used for war work, there was no room for the fifty rabbits on which he was experimenting. Hutches were quickly built on the grounds of the Pauling home, and the rabbits were moved there. It was young Peter's job to take care of them.

One morning Peter went out to feed the rabbits as usual. A moment later he came dashing into the

house. He had seen a strange picture painted on the garage door—a Japanese flag and under it the words "Americans die, but we love Japs."

That day and the next anonymous telephone calls and letters threatened the lives of the Paulings. They were accused of giving help to the enemy!

In spite of these threats, Linus and Ava Helen kept their Japanese gardener until he was called back to Camp Shelby, and the sheriff kept a twenty-four-hour guard around the house to protect the family from hostile neighbors.

In August 1945 Germany had been defeated, but the United States was still at war against Japan. In order to force a quick surrender, a United States bomber dropped a bomb on the city of Hiroshima, Japan. It was a new kind of bomb, an atom bomb, one that the world had never before experienced. It exploded with a tremendous blast and a burst of light brighter than a thousand suns. A column of smoke roared into the air and formed itself into a queer mushroom-shaped cloud that blotted out the light of the sun.

Fires broke out. Wind spread the fires. In a short time a large part of the city was almost completely destroyed. Between 70,000 and 80,000 people were killed instantly. Others were badly burned and injured.

A second bomb was dropped over the city of Nagasaki three days later. Fire and death followed this bomb, too.

A few days later, on August 14, Japan surrendered. The war was over, but the world had been

introduced to the horror of the atom bomb.

Linus junior returned safely to the Pauling household, and the family was happy to be united again. Pauling looked forward to returning to his beloved laboratory and classroom. He wanted to forget the horrors of war and the atomic bomb. He knew that American scientists had been responsible for creating the bomb, and he was grateful that he had not been among them.

For Ava Helen the tragedy and misery of war was too great to forget. She had always been concerned about world affairs. Now her concern was greater than it had ever been.

"What good will science do if the world is destroyed, Linus?" she asked. "War is the greatest evil. There must be an end to it. You and I must work toward that end."

Linus the scientist wanted to return to his work. But Linus the citizen knew that his wife was right.

8 The Atomic Age, Mr. McCarthy, and the Nobel Prize

WITH the bombings of Hiroshima and Nagasaki the world had been ushered into the Atomic Age.

For many weeks thousands of people in the two Japanese cities died or became ill, crippled, or disfigured. They were suffering from the radioactive particles spewed into the air by the atom bomb. The bomb continued to take its toll. Many years later people still showed symptoms of radiation damage.

A new bomb, more powerful than the atom bomb, was being developed. It was the hydrogen, or H, bomb. The United States and the Soviet Union were testing them. Fallout consisting of radioactive particles was entering the atmosphere and being carried around the earth. Dr. Pauling believed that these radioactive atoms would affect

living persons as well as unborn children for many generations to come. The radioactive atoms descended slowly to the ground, settled on the grass that cattle ate, then into the milk that children drank, and the meat that people consumed. Dr. Pauling believed that this poisonous fallout affected the genes, the parts of the body concerned with heredity. A change in the genes could cause millions of children to be born dead or deformed or mentally defective.

Many scientists agreed with Dr. Pauling. Others did not, and they continued to work on developing more powerful bombs, becoming known as "warrior scientists." One of these warrior scientists was Dr. Edward Teller, a chemist and one of Pauling's most outspoken opponents. He had been one of the first people to work on developing the hydrogen bomb.

Pauling and Teller debated the issue over television. Teller said that there was no harm in radiation. But Pauling's studies and observations had convinced him that he was right and Teller was wrong. He believed that these radioactive atoms could remain upon the earth and affect its inhabitants for hundreds of thousands of years.

Pauling spent much of his time the next few years away from his laboratory and his classroom and the work he loved most. But he felt that as a scientist he had an obligation to tell the people what he knew. He spoke of the necessity for nations to produce fewer armaments. "If there were world law to help nations settle disputes," he said, "there would be no necessity for ar-

maments.'' And always he told of the horrible effects of nuclear fallout, of the necessity to stop testing immediately and to abolish nuclear weapons entirely. He spoke in churches, schools, and colleges. He marched and demonstrated against the bomb and for peace. His wife was always with him.

The California Institute of Technology was not happy with Professor Pauling. Many people at the institute disagreed with his views. Some wanted him fired. He lost friends among the professors. But his great prominence as a scientist brought students from all parts of the world, and his brilliant work brought funds for further work from the United States Public Health Service, the National Foundation for Infantile Paralysis, the Rockefeller Foundation, and other scientific and philanthropic groups.

Regardless of the unfriendly attitude toward him, Linus Pauling remained strong in his convictions. He continued his talks against war and for the abolition of nuclear weapons. He also continued his scientific work.

In 1947 he wrote a textbook for college students called *General Chemistry*. Now, more than thirty years later, this book, like *The Nature of the Chemical Bond*, published in 1939, is still being used.

That same year he was elected president of the American Chemical Society. He received invitations to speak to chapters of the society around the country. Crowds came to hear him.

Dr. Pauling, with his associate, Dr. Robert

Corey, had been studying the structure of proteins for over ten years. He hoped that the knowledge obtained from his studies would help to understand how normal proteins were constructed. This would shed light on how various diseases might affect the structure of these proteins. But he still had not found the answer after many years.

The human body has hundreds of different proteins. Each one has a special structure and performs a special function in the body. The proteins in the bone are different from the proteins in the blood, which are different from those in the lungs. The protein molecules are among the largest and most complex of all molecules. Pauling had set himself the task of finding out how they are constructed.

In 1948, while he was a guest professor at Oxford University in England, Pauling caught a cold. Ava Helen insisted that he stay in bed for a few days. To pass the time, he read books on his favorite subjects—science fiction and detective stories.

After a few hours of reading, Linus became bored and began to think about the structure of protein molecules. Since he did not have his colorful ball and stick models to work with, he sketched the atoms and the bonds or links between them on a sheet of paper. Then he folded the sheet at the links and kept folding until he had folded it into a helix—something that looks like a spiral staircase. He kept folding until he could form bonds between one turn of the helix and the next.

When the Paulings returned to the United

States, Dr. Pauling resumed his study of the structure of fibrous proteins such as muscle, hair, and fingernails. Dr. Corey still worked with him. They found that this chain of proteins was also twisted into a helix.

As work on proteins went on, Pauling and other scientists found that the helix was the basic shape of many protein molecules in every form of life.

One day in May 1952 Pauling received an invitation to attend a two-day conference of the Royal Society of London. The subject of the conference was to be the structure of proteins and the discovery of the helix. Dr. Pauling was to be the first speaker, Dr. Corey the second. Scientists from all over the world would be there. Pauling liked nothing better than to share his knowledge with others and in turn to learn from them. He eagerly looked forward to attending the conference.

Linus applied for a passport to England. To his amazement, the State Department refused to issue it to him. His amazement increased when they informed him of the reason—"Not in the best interest of the United States." Was it not in the best interest of the United States to exchange scientific knowledge?

The real reason soon became apparent. Linus Pauling had become unpopular with the government because of his speeches about war and peace and the testing of atom bombs.

During this period Joseph R. McCarthy, United States Senator from Wisconsin, had been accusing government employees, even officials, of disloyalty to the United States. When he became chairman

of the Senate Permanent Investigating Subcommittee, he began inquiries into the lives of many of these people.

The House Un-American Activities Committee was making similar accusations against private citizens—actors, writers, artists, scientists, and others. The committee called people before it for questioning into their lives and activities.

Many who refused to answer the questions went to jail. People were afraid to say what they believed. Linus Pauling was not afraid. He continued to speak out about the things that he felt were important to the people of America.

But Pauling was greatly disappointed about not being permitted to go to England.

Pauling decided to hold a conference in Pasadena. If he couldn't go to England, perhaps England would come to him.

In September 1953 the conference took place at the California Institute of Technology. Scientists came from England and Wales, from universities, hospitals, and industry. Pauling spoke. Corey spoke. Other scientists spoke. The protein conference was world news!

But Pauling was still angry. What reason had the government to refuse him a passport? He went to Washington to protest and to speak to officials of the State Department. They listened, but would not grant him a passport.

When Pauling applied for a passport to go to London and Paris a short time later, it was granted to him, but not the usual one that can be used for five years. This was a limited passport, good only for two months.

During the next year Pauling had a number of occasions to request passports. One such occasion occurred in October 1953. He was invited to Israel for the ceremony of laying the cornerstone of the Weizmann Institute of Science, and for the commemoration of the first anniversary of the death of Chaim Weizmann, for whom the institute was named. Dr. Weizmann, a well-known chemist, had been the first president of Israel when the country gained its independence in 1948. Scientists came from all over the world. Pauling was there, too, but on a limited passport for one trip only.

In July 1954 Dr. Pauling was refused even a limited passport. Prime Minister Nehru of India had invited him to be present at the dedication of an institute for scientific research. To his great disappointment and anger, he was not permitted to leave the country.

But things change. A few months later, on November 3, 1954, Linus Pauling was at Cornell University in New York State about to begin a lecture on abnormal hemoglobin molecules.

"Telephone call for you, Dr. Pauling. It's important."

Pauling stepped down from the platform and hurried to the telephone. A few moments later he returned and announced that he had been awarded the Nobel Prize for Chemistry for his discoveries about the nature of the chemical bond and the structure of molecules. The Nobel Prize is the highest scientific honor that anyone can receive. The students and professors who had come to hear him lecture stood up and cheered.

The Nobel Prize in science is presented in

Stockholm, Sweden. "Would he be able to get a passport for this great event?" members of the audience asked.

"I don't think there will be any trouble," Pauling replied. "Nazi Germany once caused trouble for its Noble Prize winners, but I would not expect the United States to do so."

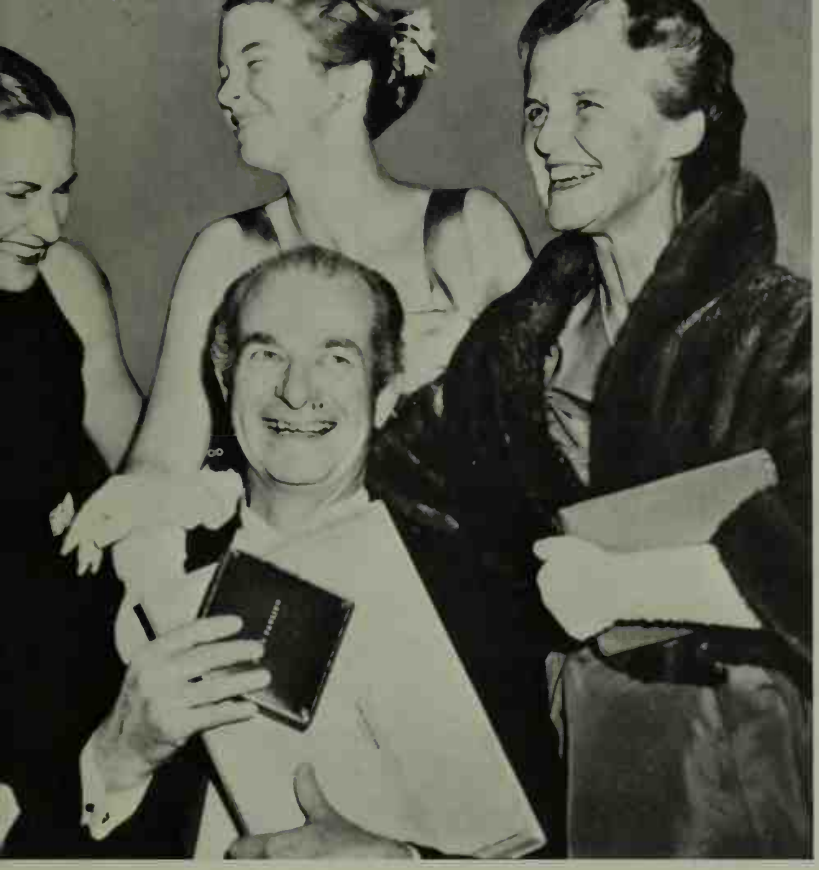
The award would be presented on December 10. On November 4 Pauling applied for a passport. A week went by, then another and another. It was a tense period in the life of the Paulings. They could not guess what the State Department would do. Finally, on November 26, just two weeks before the great day, the passport arrived!

On December 9 Linus and Ava Helen Pauling, with their daughter, Linda, their sons, Peter, Crellin, and Linus junior, and their daughter-in-law, the wife of Linus junior, walked down the ramp onto the airport of Stockholm.

Promptly at 4:30 P.M. the next day the formal Nobel Award ceremonies began. In the Royal Concert Hall in Stockholm crystal chandeliers cast a brilliant light upon the glittering audience of diplomats and scholars from around the world. The royal orchestra played soft music.

Dr. Linus Pauling sat with the other Nobel winners on the stage. In the first row of the flower-bedecked hall, King Gustavus VI of Sweden sat with his family. Pauling's family, and the families of the other Nobel laureates sat there, too.

Soft murmurs, the rustle of a few latecomers —every one waited for the ceremonies to begin. Suddenly there was quiet. The chairman of the



Just after the Nobel Prize ceremony, December 10, 1954

Nobel Prize Committee rose and walked to the center of the stage.

Linus Pauling listened as the award for physics was made. He was the next to be called. For twenty minutes the speaker related his outstanding achievements in chemistry. At the close of the speech, Dr. Pauling rose. With a smile and a warm glance at his wife and children, he stepped down from the platform to be greeted by King Gustaf. The scientist and the king shook hands, and Dr. Pauling received from the king a green leather folio containing a gold medal and a scroll. A check for $35,000 would follow. Pauling, smiling and happy, expressed his thanks and returned to his seat.

For several days following the ceremony there were parties, dances and other social activities that

kept the Pauling family busy. Dr. and Mrs. Pauling dined with the king and queen. Dr. Pauling delivered the Nobel Lecture entitled "Modern Structural Chemistry," explaining in detail his scientific work. The Nobel Lecture was requested of every Nobel winner. He also addressed several hundred college students on the subject of the hydrogen bomb and the futility of war.

When it was all over, the younger members of the family returned to work or school. Linus and Ava Helen continued their trip, visiting Israel, India and Japan. Linus gave many scientific lectures and kept his promise to talk about the dangers of the bomb and the necessity for peace. Ava Helen addressed women's groups on the importance of a peaceful world in which to raise children. They were given a loving reception everywhere by people who were opposed to the testing of atom bombs. The Japanese people were especially warm in their welcome, for they had suffered greatly from the atomic explosions.

For three months the Paulings traveled and talked. Perhaps there was still hope for a peaceful world, they told each other.

But when they returned, the atmosphere in the United States was in startling contrast to what they had found abroad.

9 A Second Nobel Prize

BACK at home, the Paulings found the atmosphere filled with fear and hysteria. People were building bomb shelters for protection against attack from the air. College students were protesting the new bombs with marches and demonstrations. And schoolchildren were practicing air-raid drills.

Some Americans were proud that we were the first to have the bomb. Other Americans, among them many students, were concerned about its dangers. They wanted to know what they could do to prevent this new weapon of destruction from being used again.

In May 1957 Pauling was invited to speak to the students at Washington University in Saint Louis, Missouri. The topic was to be "Science in the Modern World." But no one could have forecast what the results of this talk would be.

Over a thousand students and professors came to hear him. He spoke about the horrors of modern weapons, the necessity of finding new ways of solving international problems. Most of all he spoke of the new bombs that rained radioactive particles into the atmosphere.

"These bombs can destroy the world," he said. "Now is the time to fight for your lives and the lives of future generations. Don't just lie down and be Hiroshima'd."

Wave after wave of applause interrupted his speech. When he was finished, crowds of students surged forward to shake his hand, to ask questions, most of all to ask, "What can I do?"

Action followed quickly. By evening Linus Pauling and two other professors—Barry Commoner and Edward Condon—had drawn up a petition stating, "We urge immediate action for an international agreement to stop testing of all nuclear weapons." It was addressed to the governments of the world. With the help of many eager students, the petition was sent out to American scientists. Within a few weeks 2,500 scientists had signed and sent it back to Pauling. He was greatly encouraged. Linus and Ava Helen then presented it to the United Nations. But nothing was done.

A few months later the Paulings decided to send the petition to scientists all around the world. The response was overwhelming. Over thirteen thousand scientists from fifty countries signed. Many who had received the petition had translated it into their native language and obtained the signatures of other scientists in their countries. Peter Pauling in England and Linus junior in Hawaii signed, as

did Albert Schweitzer, that great and famous doctor who was helping the people of Africa.

Huge amounts of mail were arriving at the Pauling home each day. Again students came to help. Linus and Ava Helen could not have done without them. Again the petition was presented to the United Nations. And again nothing was done.

American newspapers gave very little publicity to such activities. Testing continued. The Paulings had many moments of discouragement, but they continued their efforts.

On January 1, 1958, after twenty-two years as chairman of the Division of Chemistry and Chemical Engineering of the California Institute of Technology, Linus Pauling resigned. However, he remained there as a professor.

With fewer responsibilities and more time, he wrote a book entitled *No More War!* and dedicated it to Ava Helen Pauling.

Always an optimist, Dr. Pauling opened his book with the words, "I believe that there will never again be a great world war, if only the people of the United States and the rest of the world can be informed in time about the present world situation. . . . We have to work to prevent the catastrophe of a . . . nuclear war, and to find the ways in which world problems can be solved by peaceful and rational methods."

He explained the fundamentals of nuclear energy and radioactivity, the facts about fallout, and made some original and constructive proposals for peace. The book was read and discussed all over the world.

In 1959 Linus and Ava Helen issued another

petition, urging the world to stop the spread of nuclear weapons and move toward universal disarmament. Now they did not use the mail but went directly to the people of the world. They traveled for eight months and spoke to the people of Norway, Sweden, Africa, England, and Germany.

They paid a special visit to Dr. Schweitzer, whose hospital was in the jungles of Africa near the equator. It was located on the banks of the Ogowé River. The Paulings arrived there in a canoe and found Dr. Schweitzer waiting for them.

Dr. Schweitzer and the two Paulings talked. Schweitzer agreed with them completely about the dangers of a nuclear war. They all felt strongly that money wasted on wars could better be used for homes, schools, hospitals, and a better life for people.

When they left Africa, the Paulings visited Dunedin, New Zealand. After Dr. Pauling spoke about the effects of fallout on future generations, several young girls went to the editor of the town newspaper to ask advice on how to start a children's movement against the bomb.

Ava Helen went everywhere with him. Besides being his wife she was his friend, his secretary, his nurse, his memory when he forgot a name he should have remembered, and his partner in the work for peace! Ava Helen holds the grand record for having lectured on peace in thirty-seven countries!

Upon returning to California, the Paulings needed to rest and relax after so many months of

traveling and lecturing. A few years before, they had bought a ranch along the coast of northern California, in a beautiful wooded area called Big Sur. It had a small red barn and a two-room cabin on a hill, with no electric lights or telephone—a wonderful place to escape for a few days from the world's problems. Pauling really relaxed when he was close to nature.

Early one Saturday morning Pauling went to look over his ranch. He was searching for a route to bring water from Salmon Creek. It was a brisk, sunny day in January, a good day to walk and enjoy the fresh salt breezes coming up from the Pacific Ocean. As he edged along the top of a cliff, he slipped on some loose rock and landed on a narrow ledge with the Pacific Ocean far below. He looked back at the steep slope he had just passed over and gasped with terror. One misstep and he might now be down at the bottom. A shudder of relief passed through him.

It was ten A.M. There was nothing to do but wait to be rescued.

When the sun set and Linus had not returned to the cabin, Ava Helen became anxious and went to the ranger station for help. Bloodhounds, helicopters, and residents of Big Sur were sent out looking for Linus Pauling. After a night of intense searching, the early-morning news broadcasters informed the world that the famous scientist was lost—was missing—was dead. No one knew exactly. At about ten A.M. a volunteer searcher sighted him sitting on the narrow ledge. By eleven he had been rescued and brought back to the

cabin. He had been lost just a mile away!

News of his rescue brought letters from around the world. "Happy you are preserved for the benefit of mankind and the inspiration of younger scientists," came a letter from India. Someone sent him a Boy Scout whistle. And a lady from England advised, "For goodness' sake, take care of yourself and get a couple of canines . . ."

Soon after, the Paulings returned to their home in Pasadena.

Early in January 1960 Dr. Pauling addressed a meeting in Washington, D.C., of the Women's International League for Peace and Freedom. At the close of his talk people crowded around him, pressing notes and expressions of gratitude into his hands. When he arrived home and emptied his pockets of the small pieces of paper, he found an unpleasant surprise. Someone had placed a subpoena in his hands. He was being ordered by the Senate Internal Security Committee to appear in Washington and give information about the peace petitions that he had been circulating. Pauling returned to Washington. Senator Dodd, chairman of the committee, asked him for the names of the people who had helped gather the more than thirteen thousand signatures of scientists opposed to testing. Linus had willingly answered other questions, but he refused to answer this one. He would not bring trouble to the students and other people who had given their time and energy to help him and Ava Helen. He knew that he could be found guilty of contempt and imprisoned for refusing to answer. "My conscience does not allow me to

protect myself,'' he said calmly and fearlessly. ''I shall not conform to the request of the committee.''

Dr. Pauling's stand was supported in editorials in many leading newspapers in the United States. The committee decided to drop the inquiry. But many young people were inspired by his courage in standing up for his beliefs and activities.

Senators McCarthy and Dodd were both severely criticized by their fellow senators and congressmen.

At the beginning of the year 1962 Dr. and Mrs. Linus Pauling received invitations to two events, both to occur on the same day. One was to participate in a ''Ban the Bomb'' demonstration around the White House, the other was to dine in the White House with the president of the United States. The Paulings accepted both invitations.

For two days, on April 28 and 29, Linus and Ava Helen, with several hundred other peace-loving people, picketed the White House carrying signs saying ''Ban the Bomb,'' ''We Have No Right to Test,'' and other slogans.

On the evening of the second day Dr. and Mrs. Pauling entered the White House as guests of President John F. Kennedy and Mrs. Kennedy. The President and Mrs. Kennedy had invited fifty famous scientists and writers—all Nobel Prize winners—to a dinner party.

In the elegant East Room of the White House Linus and Ava Helen joined the line of the other guests waiting to be greeted by their hosts. When it was Pauling's turn to meet the president and the

Linus Pauling in demonstration before White House, 1962

First Lady, President Kennedy smiled. "Dr. Pauling, I understand that you've already been around the White House for a couple of days," he said. "I hope you will continue to express your opinions." And Mrs. Kennedy remarked, "When Caroline saw you out there, she asked, 'What has Daddy done wrong now?' " Caroline was the Kennedys' five-year-old daughter.

A year and a half later two very important events occurred in the life of the Paulings, again on the same day.

On October 10, 1963, the limited test-ban treaty for which Linus and his wife had worked so long and so hard was signed by the countries known as the "three nuclear powers"—the United States, Great Britain and the Soviet Union. The Paulings were elated when they heard the news. At last the

Dr. and Mrs. Pauling admiring the Peace Prize gold medal, December 10, 1963

world had listened and understood and agreed.

On that very same day Dr. Linus Pauling was awarded the Nobel Peace Prize for his work in bringing about the test-ban treaty. Never before had anyone twice received this greatest of all honors—two unshared Nobel Prizes!

The family again assembled, this time in Oslo, Norway, where the ceremonies for the awarding of the Peace Prize would take place. It was a proud occasion for the Pauling children. Their father was being recognized and honored by the world for the second time. Now a twelve-year-old grandson was present, too. For Linus and Ava Helen it was deeply satisfying to know that their work had not been in vain—that there was still hope for the nations of the world to live together in peace.

In the Festival Hall of the University of Oslo,

where the presentation of the award took place, Gunnar Jahn, chairman of the Nobel Committee of the Norwegian Parliament, gave an introductory speech. He spoke of Pauling's herculean work for peace and closed with the following words:

"It is Linus Pauling's highly ethical attitude to life—the deepest driving force within him—that drew him into the fight against nuclear weapons. Through his campaigning he has manifested the ethical responsibility that science, in his opinion, bears for the fate of mankind, today and in the future.

"Should Pauling have contributed, if only a little, to restoring to science its ideals, his work will have been of such value that we living today cannot yet appreciate the full extent of the debt we owe him."

Dr. Pauling's Nobel Lecture followed. It was entitled "Science and Peace."

"We see that science and peace are related," he said. "The world has been greatly changed, especially during the last century, by the discovery of scientists. Our increased knowledge now provides the possibility of eliminating poverty and starvation, of decreasing significantly the suffering caused by disease, of using the resources of the world effectively for the benefit of humanity. But the greatest of all the changes has been in the nature of war—the several millionfold increase in the power of explosives . . . .

"There is no defense in science against the weapon which can destroy civilization.

Dr. Pauling's Nobel Lecture closed with words

of optimism and encouragement. He told his audience that the people of the world have the opportunity to abolish war and replace it with world law. "I am confident that we shall succeed . . . and that we shall in the course of time be enabled to build a world characterized by economic, political and social justice for all human beings, and a culture worthy of man's intelligence."

10 New Paths

IN 1964 Pauling retired as a professor from the California Institute of Technology where he had started as a graduate student forty-two years before. He then taught at the University of California in San Diego and after that at Stanford University, in northern California.

Pauling thought it was time to have a place where he could work in accordance with his own ideas and try to do what he wanted most—to cure people of disease and alleviate human suffering.

People had been suffering from heart disease, cancer, the common cold, and many other illnesses for ages. The medical profession had been working on cures, but no cures had been found.

Linus Pauling developed a new way of looking at disease, just as he had found a new way of looking at chemistry forty-one years before. His new way is

Dr. Pauling with his ball-and-stick models

nutrition. He believes that proper nutrition protects the body against disease and prolongs life.

In 1973, what is now known as the Linus Pauling Institute of Science and Medicine was established in Menlo Park, a beautiful suburb of San Francisco. The institute is open to all visitors who are interested in learning what Pauling and the staff are doing to try to prevent and cure disease.

In the last decade Pauling has devoted most of his time to promoting his belief that vitamin C will keep people from having colds or the flu, from having cancer or mental disorders and increase the life span.

Most animals manufacture vitamin C. Human beings do not. Because the foods we eat may not provide enough vitamins, Pauling thinks that it is necessary to give the body additional doses.

Dr. Pauling addressing a college class

Pauling has given this form of health care the name "orthomolecular medicine." *Ortho* is the Greek word for "correct," and *molecular* relates to molecules. *Orthomolecular medicine* means the right molecules in the right places in the right amounts.

Pauling himself takes a large dose of vitamin C each day. He believes that most people need at least one gram a day with a range of one to four grams daily, but that some people may need more to be in the best of health.

Many people, both laymen and doctors, do not agree with Dr. Pauling. They say that he has not done enough research and that he is not using scientific methods.

Other people, both laymen and doctors, agree with Dr. Pauling. They take daily doses of vitamins

Ava Helen and Linus Pauling at his seventy-fifth birthday reception —California Institute of Technology, February 28, 1976

and maintain that they have fewer colds and other illnesses. They are enthusiastic about Dr. Pauling and orthomolecular medicine. Time will tell whether he is right or wrong. Research on vitamin C is still going on and answers missing today may be found tomorrow. Until more research is done, Dr. Pauling's views on vitamin C are still being challenged.

To those scientists who criticize his work, his answer is: There is much more to be learned about vitamins, how they work in the body, what amounts to use, what diseases they will cure. "Work with us," he urges. "Help us find out." His emphasis is on preventive medicine.

During his lifetime, Pauling has received many honors and awards for his scientific accomplishments—from the American Chemical Society, the Royal Society of London, the Indian Academy of

Dr. Pauling with some of his research assistants at the Linus Pauling Institute of Science and Medicine

Science, and other scientific organizations.

Recognition and awards for his great contributions to science and medicine continue to come to Dr. Linus Pauling.* He has received honorary degrees from the Universities of Princeton, Yale, Chicago, Oxford, Cambridge, London, Paris, and twenty-five others.

From Ireland he received the Celtic Medal of the Irish Institute for Human Potential "in recognition of the part he has played . . . in defending the rights of the world's children and for his innovative work in preparing a better future for mankind."

Upper Volta, a country in Africa, has issued a commemorative stamp honoring him for his great contributions to chemistry.

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* He was the first recipient of the U.S. National Academy of Sciences Medal in the Chemical Sciences in 1979.

An award that pleases and amuses Dr. Pauling is a high school diploma from Washington High School, which he received more than forty years after he had left there. The students had brought to the attention of the Board of Education the fact that their most famous alumnus had never been properly graduated!

President Ford awarded him the National Medal of Science for the "extraordinary scope and power of his imagination during his long and distinguished career."

In the eminent British journal *New Scientist* Dr. Linus Pauling was ranked by readers with Isaac Newton, Madame Curie, and Albert Einstein as one of the most important scientists of all time.

As the testing of bombs continues and armaments of war are manufactured by countries large and small, Linus Pauling is not as optimistic about the world as he has been in the past. In his Nobel Peace Lecture in 1963 he expressed hope for an end to war. In a centennial speech in 1976 before the American Chemical Society he spoke in another vein.

"Of all the follies of modern man, the waste of one tenth of the world's wealth year after year on war and militarism is the greatest, and the successful attack on this problem will lead to the greatest benefit to mankind . . . .

"Unless we are wiser than we have shown ourselves to be in the past . . . there will be a catastrophe during the coming century, perhaps a series of catastrophes. The human race might survive. By 2076 we shall, I hope, have solved these

problems, and from then on we may have a world in which every person who is born will have the opportunity to lead a good life."

Dr. Pauling believes that it is the duty of every citizen, young and old, to work toward that end.

Linus's and Ava Helen's children are grown now, and the parents take great pride and pleasure in their accomplishments. Linus junior, the oldest, is a psychiatrist practicing in Hawaii. Peter is a chemist working at the University of London. Crellin, the youngest of the Pauling children, is a biochemist and geneticist in the University of California at Riverside, not far from Los Angeles. Linda, the only daughter, is a graduate of Reed College and lives with her husband, Barclay Kamb, a professor of geophysics at the California Institute of Technology, in the house "like a molecule" in Pasadena. She is busy raising four sons and planning a career for herself in the field of nutrition.

All the children are married. There are fifteen grandchildren and one great-grandchild. Several of them have the name Linus junior, like their famous grandfather. Linus and Ava Helen would like to see them more than they do. But with their sons and daughter living in different places, this doesn't happen often. The Paulings look forward with pleasure to those rare occasions when the family can gather together to celebrate, to talk, and to enjoy one another's company.

For over fifty years Dr. Pauling has studied a wide range of scientific and human problems. He has published more than five hundred scientific papers on molecules, hemoglobin, protein, im-

The Linus Pauling Institute of Science and Medicine

munology, anesthesiology, sickle-cell anemia, and human nutrition. His most recent writing is a book called *Cancer and Vitamin C*, written in collaboration with Dr. Ewan Cameron.

Pauling and Ava Helen still travel widely. In the last few years they have visited Scotland, Cuba, England, China, Mexico, the Soviet Union, and other countries. As recently as the summer of 1979 they were on a lecture tour in Ireland and Holland.

Linus and Ava Helen often go to their ranch in Big Sur, near the ocean and the mountains that they both love. Here Linus rests, writes, and hikes along the coastline. But his mind is always at work on new ideas. When he comes upon one, he pursues it with the same enthusiasm he did when he first began his life's work.

His youthful pink cheeks have faded somewhat, and his hair is a little sparse. But his eyes still

sparkle with the excitement of living and working.

At the Linus Pauling Institute of Science and Medicine in a lovely tree-shaded area in Menlo Park, Dr. Linus Pauling continues his efforts to relieve human suffering. And wherever they go, Linus and Ava Helen, who have shared their lives together for over half a century, continue to speak and to work for a world at peace.

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PHOTO BY JUDITH ANNE WHITE

Dr. Pauling and the author at the Pauling home in California.

The Author

Florence Meiman White studied history, government, and economics at Hunter College. She did graduate work in elementary education and child psychology and followed with a degree in law. Most of all, she enjoys writing for young people. She has written ten books, including fiction, science, and biography, and is busy writing more books about great men and women.

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—GUNNAR JAHN
Chairman, Nobel Committee of the Norwegian Parliament
December 10, 1963

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